

**Inventory of Small Mammals on New Lands in Pinnacles National Monument
Progress Report 2003**

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Introduction

Pinnacles National Monument (PINN) is situated in the Gabilan range in central California. In 2000 the monument acquired 8065.8 acres from the Bureau of Land Management. This acquisition boosted the total acreage of the park to 24336.9 acres, private in-holdings notwithstanding. The purpose of this study was to determine which small mammal species occur in the park's new lands.

The new lands are situated throughout the monument including tracts south and west of South Chalone Peak, in Grassy Canyon and in the northern section of the park near Marion Canyon and Black Canyon. Other tracts of new land are located in McCabe Canyon and in the western section of the monument, north of the Chaparral Ranger Station. During this study surveys were performed in South Wilderness, Grassy Canyon and locations near Marion Canyon.

Small mammals include members of the orders Rodentia and Insectivora. Previous small mammal surveys performed at PINN evidenced fifteen small mammal species: *Dipodomys elephantinus*, *D. heermanni*, *D. venustus*, *Eutamias merriami*, *Mus musculus*, *Microtus californicus*, *Neotoma fuscipes*, *N. lepida*, *Perognathus californicus* (now *Chaetodipus californicus*), *Peromyscus boylii*, *P. californicus*, *P. maniculatus*, *Reithrodontomys megalotis*, *Sorex ornatus*, *Spermophilus beecheyi* (Fellers 1988, Fesnock 1999). During this survey seven species were documented: *Chaetodipus californicus*, *Dipodomys elephantinus*, *D. heermanni*, *Neotoma lepida*, *Peromyscus boylii*, *P. maniculatus*, and *P. truei*.

Methods

Site Selection

With the allotted time and resources it was impossible to survey all tracts of new land. Three overarching areas were selected: Grassy Canyon, South Wilderness and a site in an unnamed tributary to Marion Canyon. Site selection was highly dependent upon accessibility. Potable water had to be driven to base camps in South Wilderness and Marion Canyon. Both locations were accessible to vehicles only via private property. While the landowner bordering South Wilderness drove water and equipment to that camp several weeks ahead of the trap session, the researcher was not allowed to drive to that location.

Within each location transects were established within reasonable walking distance of one another. An attempt was made to sample each wildlife habitat type present in the greater trapping area (Mayer, et al. 1988). An effort was made to contain each transect within a single habitat type.

Trap Placement and Monitoring

Two types of transects were employed during this study. Both transects were 100m long with stations placed at 10m intervals. Stations were marked with flagging. Flagging was removed after each area had been surveyed.

In method one two traps were placed at each station (within 2m of one another) yielding twenty traps per transect. Method two had one trap per station, yielding ten traps per transect. The second method enabled the researcher to sample more areas during a given trap session. Method 2 was employed (in concert with method 1) in Marion Canyon and South Wilderness. Both methods employed mammal traps (76 x 89 x 229 mm) manufactured by H.B. Sherman Traps, Inc.

Trapping sessions lasted 3 nights unless weather dictated otherwise. Traps were checked each morning. They were baited with horse feed until May, when the supply became moldy. Afterwards they were baited with rolled oats mixed with peanut butter (approximately 1 TBSP peanut butter per 5 cups oats).

Animal Processing

Captured animals were transferred from traps to plastic storage bags for processing. Animals were identified to species. If age or morphology prevented identification to species, animals were identified to genus. Additional measurements included age (adult/juvenile), sex, reproductive status (male: scrotal/non-scrotal; female: lactating/pregnant/not-active), total length, tail length, hind foot length, ear length, and weight. Weight was measured with a Pesola scale. For *Neotoma* spp. only weight and sex were recorded. Because this survey was to determine species presence moreover density and survivorship, animals were generally not marked.

Habitat Characterization

Habitats were classified into categories presented in Mayer, et al. 1988. Categorization was qualitative in nature. Habitats were assigned according to the gestalt of vegetation present at each transect. Whether a transect was dominated by chamise chaparral, yerba santa, or burned chaparral it was categorized as "mixed chaparral." Likewise the designation "valley oak hardwood" represents both blue-oak woodlands and coast live-oak woodlands. Mixed riparian transects were located along creeks and small streams, whether wet or dry. While assorted types of pine woodlands are present in the park no sizeable stands were located within trapping areas. Annual grasslands are composed mainly of non-native grasses. One pure grassland stand was sampled during this survey, though some chaparral and riparian transects also contained grasses.

Results and Discussion

Fieldwork was performed between February and June 2003. That time is characteristically a period of low trap success with late summer yielding more captures

(Cook 2001). Additionally, this survey was performed during a single period of five months. Similar surveys were performed across multiple seasons and multiple years (Chamblin 2002, Cook 2001, Fellers 1988). Timing and brevity of this study combined with personnel constraints (one GS-05 technician working 50%) undoubtedly contributed to low capture rates and low species diversity.

Forty-nine captures were recorded during 2020 trap nights (Table 1 & Table 2). Herein a trap night is considered one trap set for one night.

Table 1. Total Captures

Species	Sex			Age			T
	F	M	U	A	J	U	
<i>Chaetodipus californicus</i>	9	5	0	10	4	0	14
<i>Dipodomys elephantinus</i>	5	2	1	6	1	1	8
<i>Dipodomys heermanni</i>	3	2	0	4	1	0	5
<i>Dipodomys</i> spp.	0	1	0	1	0	0	1
<i>Neotoma lepida</i>	7	0	2	7	0	2	9
<i>Peromyscus boylii</i>	1	1	0	2	0	0	2
<i>Peromyscus maniculatus</i>	1	1	0	2	0	0	2
<i>Peromyscus</i> spp.	3	0	0	1	2	0	3
<i>Peromyscus truei</i>	6	0	0	6	0	0	6
TOTALS:	34	12	3	39	7	3	49

Table 2. Trap Nights per Habitat Type

Habitat Type	Trap Nights
Annual Grassland	60
Mixed Chaparral	1120
Mixed Riparian	560
Valley Oak Hardwood	280
Total:	2020

Mixed chaparral, the most heavily sampled habitat type (and the most abundant type within the monument) yielded 23 captures, more than any other sampled habitat type (Table 3). The second most heavily sampled habitat type, mixed riparian, yielded 20 captures. Valley oak hardwood and annual grassland respectively yielded 6 and 0 captures.

Table 3. Captures per Habitat Type

Species	Habitat Type			
	Annual Grassland	Mixed Chaparral	Mixed Riparian	Valley Oak Hardwood
<i>Chaetodipus californicus</i>	0	7	7	0
<i>Dipodomys elephantinus</i>	0	8	0	0
<i>Dipodomys heermanni</i>	0	5	0	0
<i>Dipodomys</i> spp.	0	1	0	0
<i>Neotoma lepida</i>	0	1	5	3
<i>Peromyscus boylii</i>	0	0	2	0
<i>Peromyscus maniculatus</i>	0	0	2	0
<i>Peromyscus</i> spp.	0	1	1	1
<i>Peromyscus truei</i>	0	0	3	2
Totals:	0	23	20	6

Mixed riparian exhibited the highest trap success (captures / trap nights) at 3.6 percent. Trap success in both mixed chaparral and valley oak hardwood was 2.1%. There were no captures in annual grassland habitats.

It should be noted that some transects in Grassy Canyon were surveyed as compliance for the construction of roads and facilities for the condor reintroduction project. These surveys (mainly of burned chaparral) are included herein. This is a contributing factor to the abundance of trap nights in mixed chaparral.

Grassy Canyon Area

Trapping occurred in Grassy Canyon between 11 February and 9 April 2003. Grassy Canyon was surveyed more intensely than other areas for two reasons. First, it was accessible by 4x4 vehicle along a fire road that bears south from Hwy 146 within PINN boundaries. It was not necessary to camp in Grassy Canyon and it was accessible without having to obtain permission to cross private property. Secondly (as mentioned above) some of the transects were surveyed as compliance for the construction of roads and facilities for the condor reintroduction project. These surveys (mainly of burned chaparral) are included herein.

Transects were established in three habitat types within Grassy Canyon yielding 940 trap nights (Table 4). Twenty-eight captures represented five species of small mammals (Table 5).

Table 4. Trap Nights per Habitat Type - Grassy Canyon Area

Habitat Type	Trap Nights
Mixed Chaparral	700
Mixed Riparian	80
Valley Oak Hardwood	160
Total:	940

Table 5. Captures - Grassy Canyon Area

Species	Sex			Age			T
	F	M	U	A	J	U	
<i>Chaetodipus californicus</i>	3	3	0	5	1	0	6
<i>Dipodomys elephantinus</i>	5	2	1	6	1	1	8
<i>Dipodomys heermanni</i>	3	2	0	4	1	0	5
<i>Dipodomys</i> spp.	0	1	0	1	0	0	1
<i>Peromyscus boylii</i>	1	1	0	2	0	0	2
<i>Peromyscus</i> spp.	3	0	0	2	1	0	3
<i>Peromyscus truei</i>	3	0	0	3	0	0	3
TOTALS:	18	9	1	23	5	1	28

Most captures in Grassy Canyon occurred in mixed chaparral, followed by mixed riparian and valley oak hardwood (Table 6). Trap success for each habitat type was, 3%, 5%, and 1.9% respectively. Overall trap success in Grassy Canyon was 3.0%.

Table 6. Captures per Species per Habitat Type - Grassy Canyon Area

Species	Habitat Type		
	Mixed Chaparral	Mixed Riparian	Valley Oak Hardwood
<i>Chaetodipus californicus</i>	6	0	0
<i>Dipodomys elephantinus</i>	8	0	0
<i>Dipodomys heermanni</i>	5	0	0
<i>Dipodomys</i> spp.	1	0	0
<i>Peromyscus boylii</i>	0	2	0
<i>Peromyscus</i> spp.	1	1	1
<i>Peromyscus truei</i>	0	1	2
Totals:	21	4	3

South Wilderness Area

Trapping commenced in South Wilderness during two separate sessions between 25 April and 9 May 2003. South Wilderness was the most difficult area to sample. While an adjacent landowner drove traps and water to the park boundary several weeks in advance of trapping, the researcher was not permitted to access the site via private property. This required packing supplies to the site via the trail from North Chalone Peak to South Chalone Peak. The westward decent from the saddle between the two peaks is marked by loose rocks and steep slopes. The hike is “sketchy” at best, especially carrying several dozen pounds of equipment. Water containers and traps were carried out of South Wilderness via the same route by the researcher and two kind members of the Vegetation Mapping Crew.

Transects were established in three habitat types within South Wilderness (Table 7). Seven captures yielded four species (Table 8).

Table 7. Trap Nights per Habitat - South Wilderness Area

Habitat Type	Trap Nights
Annual Grassland	60
Mixed Chaparral	300
Mixed Riparian	180
Total:	540

Table 8. Captures - South Wilderness Area

Species	Sex			Age			T
	F	M	U	A	J	U	
<i>Chaetodipus californicus</i>	0	1	0	0	1	0	1
<i>Neotoma lepida</i>	1	0	2	1	0	2	3
<i>Peromyscus maniculatus</i>	1	1	0	2	0	0	2
<i>Peromyscus truei</i>	1	0	0	1	0	0	1
TOTALS:	3	2	2	4	1	2	7

Most captures in South Wilderness occurred in mixed chaparral, followed by mixed riparian (Table 9). Trap success for each habitat type was 1.7% and 1.1% respectively. No captures occurred in annual grasslands. Overall trap success in South Wilderness was 1.3 percent.

Table 9. Captures per Species per Habitat Type - South Wilderness Area

Species	Habitat Type		
	Annual Grassland	Mixed Chaparral	Mixed Riparian
<i>Chaetodipus californicus</i>	0	1	0
<i>Neotoma lepida</i>	0	1	2
<i>Peromyscus maniculatus</i>	0	2	0
<i>Peromyscus truei</i>	0	1	0
Totals:	0	5	2

Marion Canyon Area

Trapping occurred in the Marion Canyon area on two separate occasions between 14 May and 7 June 2003. The Marion Canyon base camp was located at an established trail crew camp. The trail crew camp was not in new lands, but it was relatively close to new lands. It was accessible via a 4x4 road that began on private property west of Hwy. 25. The property was owned by a PINN employee, which made access easier to obtain than in the South Wilderness area.

Transects were placed east of the trail crew camp at the mouth of and within an unnamed tributary to Marion Canyon informally called "The Narrows." Transects were established within three habitat types, yielding 14 captures during 540 trap nights (Table 10, Table 11).

Table 10. Trap Nights per Habitat - Marion Canyon Area

Habitat Type	Trap Nights
Mixed Chaparral	120
Mixed Riparian	300
Valley Oak Hardwood	120
Total:	540

Table 11. Captures - Marion Canyon Area

Species	Sex			Age			T
	F	M	U	A	J	U	
<i>Chaetodipus californicus</i>	6	1	0	5	2	0	7
<i>Neotoma lepida</i>	6	0	0	6	0	0	6
<i>Peromyscus truei</i>	1	0	0	1	0	0	1
TOTALS:	13	1	0	12	2	0	14

Most captures in the Marion Canyon area occurred in mixed riparian habitats, followed by valley oak hardwood habitats (Table 12). Trap success for each habitat type was 3.7% and 2.5% respectively. No captures occurred in mixed chaparral. Overall trap success in the Marion Canyon Area was 2.6 percent.

Table 12. Captures per Species per Habitat Type - Marion Canyon

Species	Habitat Type		
	Mixed Chaparral	Mixed Riparian	Valley Oak Hardwood
<i>Chaetodipus californicus</i>	0	7	0
<i>Neotoma lepida</i>	0	3	3
<i>Peromyscus truei</i>	0	1	0
Totals:	0	11	3

Recommendations

Subsequent mammal surveys of new lands ought to employ more than one technician. Multiple technicians can survey each new land area more intensively than one technician. More technicians can deploy and maintain more traps and sample more habitat types in a given period than one technician. Both factors will result in a more robust (and more meaningful) data set. This intensive sampling is especially crucial in remote new land locations such as the South Wilderness, near Marion Canyon and Black Canyon.

While researchers are working in remote locations, they ought to collect other data useful to the park. Detailed vegetation data, burrow density data and prey sample data from avian nests and mammal stools are a few examples of the endless quantities of data waiting to be gathered. Mammal trappers have all day (after the morning trap-check) to collect data. Not to utilize them is a waste of park funds.

The researchers should plan to visit a set number of new land locations (i.e. South Wilderness, Grassy Canyon, Black Canyon, Marion Canyon, McCabe canyon). At each location the researchers ought to monitor a set number of transects. Note that more traps per transect may yield more captures. Also note that more traps per transect yield fewer transects per area and fewer sampled habitat types per area. Again, employing more than one technician will alleviate this problem.

The park service ought to provide funding for these locations to be surveyed during each of the four seasons. The park service also ought to provide funding for these locations to be surveyed across multiple years. Surveys performed in the same area over a longer time yield data about population dynamics and survivorship that are not obtained during a single season presence/absence study.

This may require several camping / backpacking trips as well as coordination with surrounding landowners. Park managers ought not to be condescending to local

landowners! The manner in which this researcher has heard park managers speak to landowners is embarrassing. Condescension is a sure way to make enemies of potential allies and benefactors!

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